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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,343	08/19/2003	Craig S. Calvert	PM 2002.001	3824

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EXAMINER
SHARON, AYAL I

ART UNIT	PAPER NUMBER
2123	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/643,343	CALVERT ET AL.	
	Examiner	Art Unit	
	Ayal I. Sharon	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 August 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/18/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1 and 3-18 of U.S. Application 10/643,343, originally filed on 8/19/2003, have been presented for examination.
2. Claims 17-18 are new. Claim 2 has been cancelled.

Drawings

3. Figure 6A is objected to for lack of legibility. Formal drawings will be required when the application is allowed.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. **Claims 1 and 3-18 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.**
6. The Examiner respectfully submits that under current PTO practice, the claimed invention does not recite *either a useful or a tangible result.*
7. The fundamental test for patent eligibility is to determine whether the claimed invention produces a "**useful, concrete and tangible result.**" See State Street Bank & Trust Co. v. Signature Financial Group Inc., 149 F. 3d 1368, 47 USPQ2d

1596 (Fed. Cir. 1998) and AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352, 50 USPQ2d 1447 (Fed. Cir. 1999). In these decisions, the court found that the claimed invention as a whole must accomplish a practical application. That is, it must produce a "useful, concrete and tangible result."

8. See State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. ("[T]he transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces 'a useful, concrete and tangible result' – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades").
9. See also AT&T, 172 F.3d at 1358, 50 USPQ2d at 1452 (Claims drawn to a long-distance telephone billing process containing mathematical algorithms were held patentable subject matter because the process used the algorithm to produce a useful, concrete, tangible result - a primary inter-exchange carrier ("PIC") indicator - without preempting other uses of the mathematical principle).
10. The Examiner respectfully submits that the claimed invention does not recite a concrete, useful, tangible result.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. The prior art used for these rejections is as follows:

    a. Jones et al., U.S. PG-PUB 2003/0182093. ("**Jones**").

13. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

14. **Claims 1 and 3-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Jones.**

15. The applied reference has a common assignee, and common inventors with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

16. In regards to Claim 1, Jones teaches the following limitations:

1. (Currently amended) A computer implemented method of generating a model of a random field which has directionally varying continuity, comprising:
a) specifying a tentative model of a subsurface region of interest for said random field;
b) identifying connected strings of nodes within said tentative model, wherein a a grid of azimuths is used to identify said connected strings of nodes;
c) performing a spectral simulation on each of said connected strings of nodes;
d) updating said tentative model with data values resulting from said spectral

simulations.

(See Jones, especially: Figs.3 and 4, and paragraphs [0032] to [0044])

Jones expressly teaches that the 3D model is "azimuthally controlled for the feature of interest" (see paragraphs [0025] and [0028]-[0029]). Moreover, it is inherent that in an XYZ coordinate system where the three axes are orthogonal, if one axis is "azimuthally controlled", the others must also be adjusted on an azimuth to their original positions in order to preserve orthogonality between the three axes.

17. In regards to Claim 3, Jones teaches the following limitations:

3. (Currently amended) The method of claim 1, wherein said tentative model is subdivided into layers, and steps b), c) and d) are performed on a layer-by-layer basis.

(See Jones, especially: Figs.3 and 4, and paragraphs [0032] to [0044])

18. In regards to Claim 4, Jones teaches the following limitations:

4. (Currently amended) The method of claim 1, wherein for each of said connected strings of nodes said spectral simulation comprises:
a) determining a phase spectrum from a Fourier transform of each of said connected strings of nodes;
b) specifying an amplitude spectrum which represents the maximum-desired spatial continuity for each of said connected strings of nodes; and
c) inverse Fourier transforming said phase spectrum and said amplitude spectrum to determine updated data values for said nodes in each of said connected strings of nodes.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

19. In regards to Claim 5, Jones teaches the following limitations:

5. (Currently amended) The method of claim 4, wherein one or more of each of said connected strings of nodes is s padded with additional data values prior to calculation of the Fourier transform of each of said connected strings of nodes.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

20. In regards to Claim 6, Jones teaches the following limitations:

6. (Currently amended) A computer implemented method of generating a model of a random field which has directionally varying continuity, comprising:
a) specifying a tentative model of a subsurface region of interest for said random field having one or more layers;
b) for each of said layers in said tentative model.
[i] specifying a grid of azimuths for nodes in said tentative model;
[ii] using said grid to identify connected strings of nodes within said tentative model;
[iii] performing a spectral simulation on each of said connected strings of nodes, each spectral simulation involving a determination of a phase spectrum from a Fourier transform of each of said connected strings of nodes, a specification of an amplitude spectrum which represents the maximum-desired spatial continuity for each of said connected strings of nodes; and the inverse Fourier transform of said phase spectrum and said amplitude spectrum to determine updated data values for said nodes in each of said connected strings of nodes; and
[iv] updating said tentative model with data values resulting from said spectral simulations.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

21. In regards to Claim 7, Jones teaches the following limitations:

7. (Currently amended) The method of claim 6, wherein one or more of each of said connected strings of nodes is padded with additional data values prior to calculation of the Fourier transform of said one or more of each of said connected strings of nodes.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

22. In regards to Claim 8, Jones teaches the following limitations:

8. (Currently amended) The method of claim 1, wherein neighboring nodes to each said node in each of said connected strings of nodes are identified and further wherein said spectral simulation is multidimensional.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

23. In regards to Claim 9, Jones teaches the following limitations:

9. (Currently amended) The method of claim 6, wherein neighboring nodes to each said node in each of said connected strings of nodes are identified and wherein said spectral simulation is two-dimensional.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

24. In regards to Claim 10, Jones teaches the following limitations:

10. (Currently amended) The method of claim 1, wherein said tentative model is specified from a spectral simulation comprising:
a) determination of a phase spectrum from a Fourier transform of a first estimate of said tentative model;
b) specification of an amplitude spectrum for said tentative model; and
c) inverse Fourier transforming said phase spectrum and said amplitude spectrum to determine said tentative model.

(See Jones, especially: Jones, Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

25. In regards to Claim 11, Jones teaches the following limitations:

11. (Currently amended) The method of claim 10, where said amplitude spectrum characterizes a short-range continuity desired in said tentative model.

(See Jones, especially: Jones, Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

26. In regards to Claim 12, Jones teaches the following limitations:

12. The method of claim 10, where said spectral simulation is applied on a layer-by-layer basis to each of one or more layers of said tentative model.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

27. In regards to Claim 13, Jones teaches the following limitations:

13. The method of claim 10, where said tentative model is specified from a three-dimensional spectral simulation.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

28. In regards to Claim 14, Jones teaches the following limitations:

14. (Currently amended) The method of claim 13, wherein said identified connected strings of nodes are used to identify curtains of connected nodes, and two-dimension spectral simulation is applied to each of said curtains.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

29. In regards to Claim 15, Jones teaches the following limitations:

15. The method of claim 1, wherein a grid of dips is used to identify said strings of connected nodes.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

30. In regards to Claim 16, Jones teaches the following limitations:

16. (Currently amended) The method of claim 1, wherein a combined grid of dips and azimuths are used in three-dimensions to identify said connected strings of nodes.

(See Jones, especially: Fig.3 Items 310, 312, and 314; and Fig.4, Items 412, 414, and 416; and paragraphs [0032] to [0044]. See also paragraphs [0009] and [0010].)

31. In regards to Claim 17, Jones teaches the following limitations:

17. (New) The method of claim 1, wherein said grid of azimuths corresponds to blocks in said tentative model.

(See Jones, especially: Fig.2; and paragraphs [0025] to [0029].)

32. In regards to Claim 18, Jones teaches the following limitations:

18. (New) The method of claim 1, wherein said identifying connected strings of nodes within said tentative model is repeated until each node within the tentative model is associated with one of the connected strings of nodes.

(See Jones, especially: Fig.2; and paragraphs [0025] to [0029].)

Response to Arguments

Re: Claim Rejections - 35 USC § 101

33. Applicants' response to the 35 USC § 101 rejections (see pp.6-7 of the amendment filed on 12/18/2006) are not persuasive.

34. The claims are directed to methods and apparatuses for "generating a model of a random field." The examiner is applying the broadest reasonable interpretation of the term "field", which can refer not only to terrain, but also to magnetic fields, gravitational fields, electric fields, etc.

35. This claimed subject matter lacks a practical application of a judicial exception (law of nature, abstract idea, naturally occurring article/phenomenon) since it fails to produce a useful, concrete and tangible result as required in State Street Bank & Trust Co. v. Signature Financial Group Inc., 149 F. 3d 1368, 1373-74 (Fed. Cir. 1998) and AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352, 50 USPQ2d 1447 (Fed. Cir. 1999).

36. The test for practical application as applied by the examiner involves the determination of the following factors:

a. "**Useful**" – According to MPEP § 2106 (IV)(C)(2)(2)(a), the USPTO's official interpretation of the utility requirement provides that the utility of an invention has to be (i) specific, (ii) substantial and (iii) credible. MPEP § 2107 and In re Fisher, 421 F.3d at 1372 (citing the Utility Guidelines with approval for interpretation of "specific" and "substantial"). In addition, when the examiner has reason to believe that the claim is not for a practical application that produces a useful result, the claim should be rejected, thus requiring the applicant to distinguish the claim from the three 35 U.S.C. 101 judicial exceptions to patentable subject matter by specifically reciting in the claim the practical application.

b. "**Tangible**" - Applying In re Warmerdam, 33 F.3d 1354 (Fed. Cir. 1994), the examiner will determine whether there is simply a mathematical construct claimed, such as a disembodied data structure and method of making it. If so, the claim involves no more than a manipulation of an abstract idea and therefore, is nonstatutory under 35 U.S.C. § 101. In addition, According to MPEP § 2106 (IV)(C)(3), a claim that recites a computer that solely calculates a mathematical formula, or a computer disk that solely stores a mathematical formula, is not directed to the type of subject matter eligible for patent protection. Gottschalk v. Benson, 409 U.S. 63 (1972).

c. "**Concrete**" - According to MPEP § 2106 (IV)(C)(2)(2)(a), a claimed process must have a result that can be substantially repeatable, or the process must substantially produce the same result again. In re Swartz, 232 F.3d 862, 864 (Fed. Cir. 2000) (finding that an asserted result produced by the claimed invention is "irreproducible" claim should be rejected under section 101). The opposite of "concrete" is unrepeatable or unpredictable. An appropriate rejection under 35 U.S.C. § 101 should be accompanied by a lack of enablement rejection, because the invention cannot operate as intended without undue experimentation.

37. The claimed subject matter does not produce a useful or tangible result:

a. A **"Useful"** result is missing because the claimed subject matter fails to sufficiently reflect at least one practical utility set forth in the descriptive portion of the specification. More specifically, while the described practical utility is directed to simulating the performance of petroleum reservoirs (see paragraphs [0003] and [0004]), the claimed subject matter relates ONLY to generating a "model of a random field", which when given the broadest reasonable interpretation does not have a specific practical utility.

b. A **"Tangible"** result is missing because the claimed subject matter fails to produce a result that is limited to having real world value rather than a result that may be interpreted to be abstract, such as a thought, a computation, or manipulated data. More specifically, the claimed subject

matter provides for "updating [a] tentative model." This produced result remains in the abstract and, thus, fails to achieve the required status of having real world value.

Re: Claim Rejections - 35 USC § 102 – Jones Reference

38. Examiner respectfully disagrees with Applicants' characterization of the Jones reference (see pp.7-8 of the amendment filed 12/18/2006) that it "fails to disclose" the claimed features of:

> "identifying connected strings of nodes within said tentative model, wherein a grid of azimuths is used to identify said connected strings of nodes" as recited in claim 1;
>
> "specifying a grid of azimuths for nodes in said tentative model" as recited in claim 6;
>
> "using said grid to identify connected strings of nodes within said tentative model" as recited in claim 6.

39. Contrary to Applicants' arguments, Jones expressly teaches that the 3D model is "azimuthally controlled for the feature of interest" (see paragraphs [0025] and [0028]-[0029]). Moreover, it is inherent that in an XYZ coordinate system where the three axes are orthogonal, if one axis is "azimuthally controlled", the others must also be adjusted on an azimuth to their original positions in order to preserve orthogonality between the three axes.

40. Moreover, Applicants' arguments, Jones expressly identifies connected nodes in the model from the grid of azimuths in Figure 2. In addition, the thalweg in Fig.2 is located in a grid defined by azimuths.

Re: Claim Rejections - 35 USC § 102 – Calvert Reference

41. Examiner agrees with Applicants' characterization of the Calvert reference (see pp.8-9 of the amendment filed 12/18/2006) that it fails to disclose the use of a grid of azimuths. The rejections based on Calvert have been withdrawn.

Re: Claim Rejections - 35 USC § 103 – Calvert & Partyka

42. Examiner agrees with Applicants' characterization of the Calvert reference (see pp.8-9 of the amendment filed 12/18/2006) that it fails to disclose the use of azimuths. The rejections based on Calvert have been withdrawn.

43. Examiner also agrees with Applicants' characterization of the Partyka reference (see p.11 of the amendment filed 12/18/2006) that it does not teach the use of azimths. The Partyka reference teaches the use of "an angle of incidence for each set of Fourier transform spectral values" (see col.27, lines 38-60, and Figs.13A and 13B), however, this angle is used in mathematical equations (see col.28, lines 1-10) rather than for constructing a grid.

44. The rejections based on Calvert in view of Partyka have been withdrawn.

Conclusion

45. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a bi-week, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753.

Any response to this office action should be faxed to (571) 273-8300, or mailed to:

USPTO
P.O. Box 1450
Alexandria, VA 22313-1450

or hand carried to:

USPTO
Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon
Art Unit 2123
February 28, 2007

3/1/07

PAUL RODRIGUEZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100